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Supporting item is attached to the report as separate file (MP3), Audio 1 hr. 30 mins.

14. ABSTRACT

The webinar discussed the impact of mTBI in service members, described screening programs implemented across the Defense Department and addressed some of the challenges associated with screening.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**		60	**19b. TELEPHONE NUMBER** *(include area code)*

DEFENSE CENTERS OF EXCELLENCE
For Psychological Health & Traumatic Brain Injury

Identifying Concussion / Mild TBI in Service Members

DCoE Monthly Webinar, March 22, 2012

David L. Brody, M.D., Ph.D.
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Additional Webinar Details

- Continuing education units and continuing medical education credits
  - Webinar pre-registration **REQUIRED** to receive CEUs or CME credits
  - Registration open for next 15 minutes; Register at https://dcoe.adobeconnect.com/dcoewebinar/event/registration.html
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  - Use participant pass code: **9415208#**
- Webinar information
  - Visit www.dcoe.health.mil/webinars
- Question-and-Answer Session
  - Submit questions via the Adobe Connect or Defense Connect Online question box

Agenda

- Welcome and Introduction
- Presentations
  - Dr. David L. Brody
    - Epidemiology and Impact of Concussion / Mild TBI in Service Members
  - Lt. Tracie B. Lattimore, RN, MSN, NP-C
    - Screening for Concussion / Mild TBI in Service Members
  - Cmdr. Michael Handrigan, M.D., FACEP
    - Mild TBI Pocket Guide (CONUS)
- Question-and-Answer Session / Discussion

Webinar Overview

Identifying Concussion / mTBI in Service Members

- Mild TBI is the most common form of TBI sustained in the military
- Unlike a severe or moderate TBI, mild TBI may not be easily identified
- Early detection is important
- The impact of mild TBI in service members will be discussed
- Screening programs implemented across the Defense Department will be described
- Some of the challenges associated with screening will be addressed

*Reference: *Invisible Wounds of War: Psychological and Cognitive Injuries, Their Consequences, and Services to Assist Recovery, Rand Report 2008*

DEFENSE CENTERS OF EXCELLENCE
For Psychological Health & Traumatic Brain Injury

Epidemiology and Impact of Concussion / Mild TBI in Service Members

David L. Brody, M.D., Ph.D.
Associate Professor of Neurology
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Required Disclaimer

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DoD Definition of TBI

- A traumatically induced structural injury and/or physiological disruption of brain function as a result of external force that is indicated by new onset or worsening of at least one of the following clinical signs, immediately following the event:
  - Loss of or a decreased level of consciousness
  - Loss of memory for events immediately before or after the injury
  - Alteration in mental state at the time of the injury (confusion, disorientation, slowed thinking, etc.)
  - Neurological deficits (weakness, loss of balance, change in vision, praxis, paresis/plegia, sensory loss, aphasia, etc.) that may or may not be transient
  - Intracranial lesion

DoD Definition of TBI – External Forces

- External forces may include any of the following events:
  - The head being struck by an object
  - The head striking an object
  - The brain undergoing an acceleration/deceleration movement without direct external trauma to the head
  - A foreign body penetrating the brain
  - Forces generated from events such as blast or explosion, or other force yet to be defined (Defense Department, 2007)

DoD Definition of Concussion / Mild TBI

- Normal structural imaging
- Loss of consciousness = 0-30 minutes
- Alteration of consciousness = a moment up to 24 hours
- Post-traumatic amnesia = 0-1 day
- These are typically 80-90 percent of all TBIs

Reference: http://www.dvbic.org/pdf/Department_of_Defense_Coding_Guidance_Traumatic_Brain_Injury_Fact_Sheet.pdf

TBI Incidence Totals

Military TBI incidence

- Defense and Veterans Brain Injury Center (DVBIC) website
  - 233,425 clinician diagnosis, 2000-2011

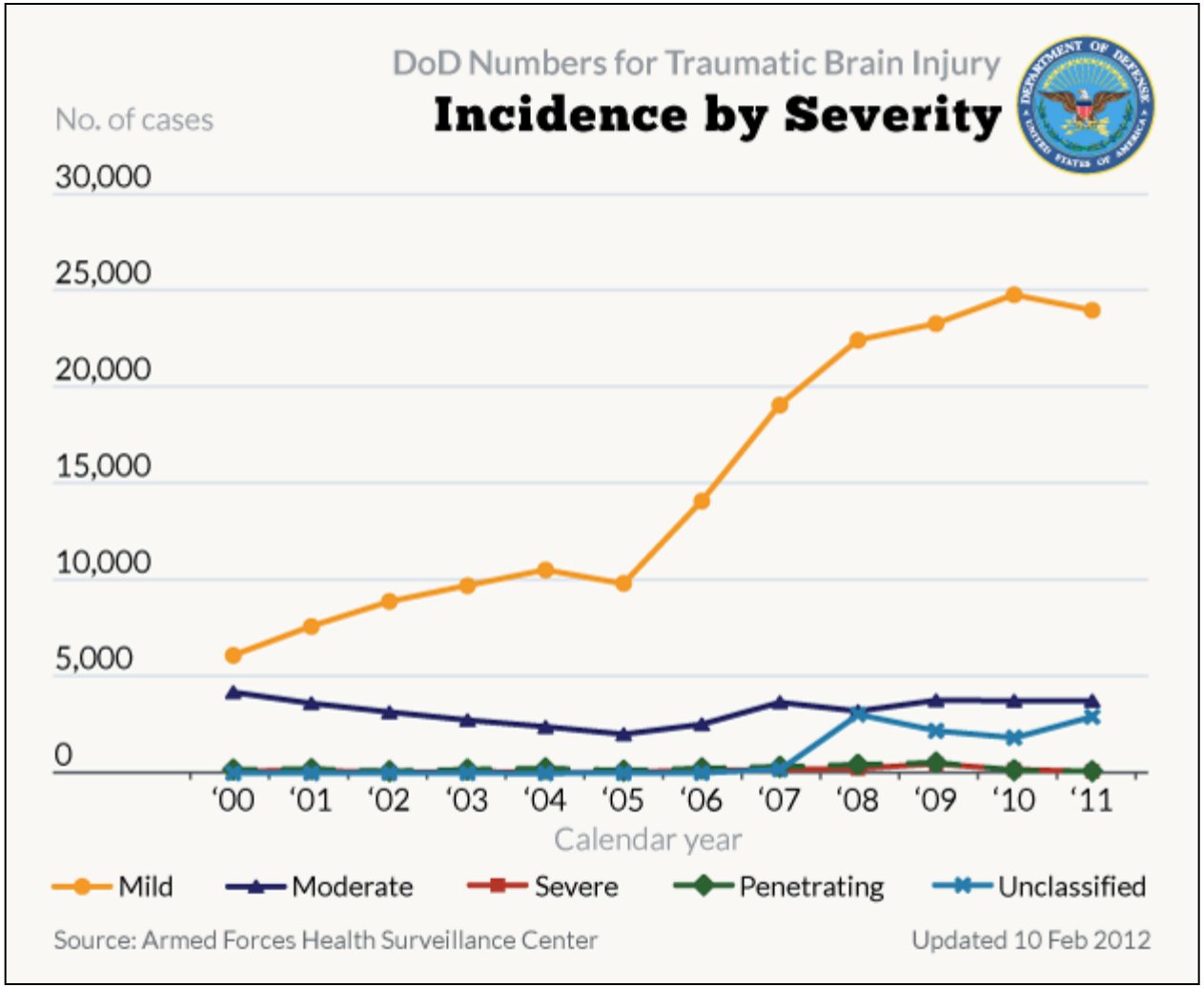
- RAND Report, 2008*
  - 19 percent of deployed 320,000
  - Extrapolated from telephone survey of 1,965 deployed individuals in 2007-2008

U.S. civilians, 2004

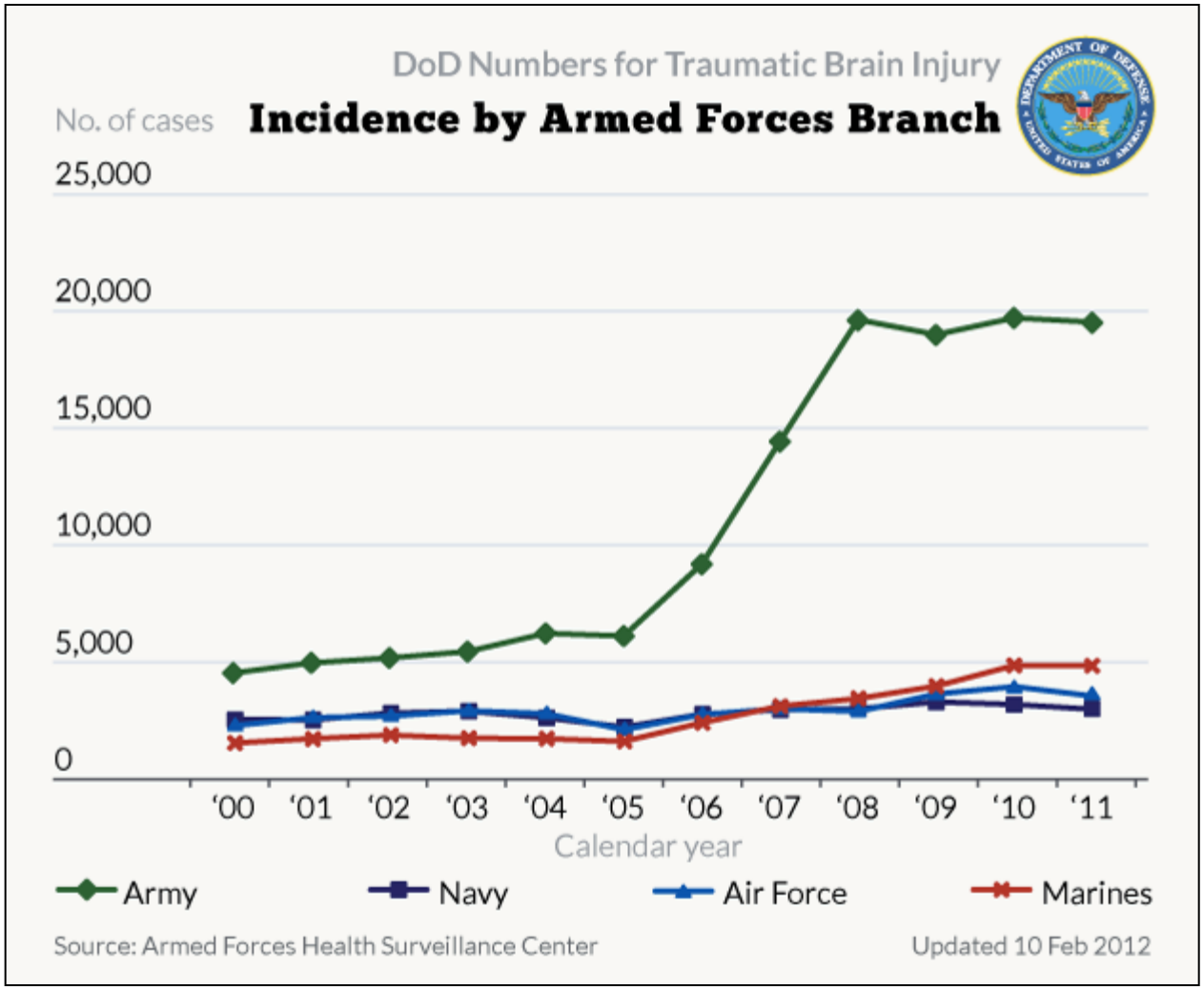
- 1.7 million per year

*Reference: *Invisible Wounds of War: Psychological and Cognitive Injuries, Their Consequences, and Services to Assist Recovery, Rand Report 2008*

DoD Worldwide TBI Incidence by Severity



DoD Worldwide TBI Incidence by Service



Causes of Concussion / Mild TBI

- Causes* (More than one cause was common)
  - Blast: 73-79 percent
  - Bullet: 1-5 percent
  - Fragment or shrapnel: 18-25 percent
  - Fall: 28-30 percent
  - Vehicle accident: 18-30 percent
  - Other: 9-13 percent

**Based on survey of 2,525 Army infantry soldiers three to four months after return from Iraq in 2006 of which 384 (15 percent) reported concussion in the previous year.*

Reference: Hoge et al., NEJM, 2008

Multiple Injuries

- Very little is known

- One study reported:
  - 0.7 percent (113 of 14,653) had two or more concussions
  - Median time between concussions equals 40 days
  - Based on reports from 2004-2008 in Iraq treated at Navy/Marine Corps facilities
  - Likely substantially under-reported based on date of study and Marine population

Reference: MacGregor et al., JRRD 2011

Multiple Injuries

- 17 percent of 1,502 infantry soldiers with heavy combat exposure in Iraq and Afghanistan reported TBI (based on self-report and not physician diagnosis)
- Of these 153/260 reported more than one TBI during their last deployment
- Has not been validated with direct physician diagnoses
- Important because multiple concussions are often associated with slower recovery and increased risk of long-term sequelae

*Reference: *Wilk et al., Psychosom Med 2012*

Bottom Line

- 10-20 percent of U.S. military personnel will experience a traumatic brain injury
- 80-90 percent of these are mild
- Nearly 80 percent are blast-related
- Unknown how many are multiple

Impact / Overview

- Headaches, both migraine and other types
- Sleep disturbances, initially hypersomnia later insomnia
- Fatigue
- Balance dysfunction
- Tinnitus
- Subjective cognitive complaints, but typically normal performance on objective tests
- Emotional dysregulation including depression and post-traumatic stress disorder
- Alcohol misuse

Historical Perspective: World War I

- During World War I, Dr. Mott described soldiers exposed to blast with:
  - “coarse tremors”
  - “inability to walk or do anything”
  - “melancholia”

- At autopsy, multiple small hemorrhages in brain and other organs

Reference: Journal of the Royal Army Medical Corps, 1917

Historical Perspective: World War II

Dr. Fabing described a group of 80 patients exposed to blast and rendered unconscious.

- These patients reported:
  - minutes to hours of anterograde amnesia
  - intractable headache in variable locations
  - noise sensitivity
  - tinnitus (transient or persistent)
  - varying anxiety symptoms, including exaggerated startle, disturbing dreams, tremor and social isolation
  - insomnia
- None had focal neurological deficits or cerebrospinal fluid abnormalities

Reference: Archives of Neurology and Psychiatry, 1947

Headaches

- Commonly reported in many series:
  - 50-80 percent in the acute phase[1]
  - 18-32 percent in U.S. military personnel three to four months after mild TBI[2]
  - 40 percent in blast-related versus 22 percent in non-blast-related TBI patients[3]

While approximately 20 percent of the general population suffers from migraine headaches, often the frequency and intensity of headaches are greatly increased after TBI.

References: 1. Luethcke JINS 2011
2. Hoge et al., NEJM, 2008
3. Wilk, J Head Trauma Rehab 2010

Sleep Disorders and Fatigue

- Self-reported in 40-54 percent of mild TBI patients[1]
- Self-reported in 60 percent of blast-related and 65 percent of non-blast-related TBI patients[2]

References: 1. Hoge et al., NEJM, 2008
2. Wilk, J Head Trauma Rehab 2010

Balance Dysfunction and Tinnitus

- Self-reported ringing in the ears in 34 percent of blast-related and 15 percent of non-blast-related TBI patients[1]
- Dizziness in 39 percent, vertigo in 24 percent and oscillopsia (instability of the visual scene) acutely after blast-related TBI[2]
- Both peripheral and central vestibular dysfunction on rotational chair testing[3]

References: 1. Wilk, J Head Trauma Rehab 2010
2. Scherer Mil Med 2007
3. Scherer Otol Neurotol 2011

Cognitive Complaints

- Self-reported cognitive concerns include:
  - Memory problems (21-40 percent)
  - Concentration problems (24-45 percent)[1]

- These symptoms were similar in blast-related versus non-blast-related mild TBI[2]

References: 1. Wilk, Psychosomatic Med 2012
2. Wilk, J Head Trauma Rehab 2010;
Lippa, J International Neuropsychological Society 2010

Cognitive Performance

Neuropsychological testing has generally revealed normal performance at subacute to chronic time points.

- Standard tests of attention, working memory and verbal learning were normal in 27 chronic TBI patients[1]
- Function was similarly normal in 27 mTBI patients with persistent symptoms and 18 without symptoms[2]
- An independent group reported no objective deficits executive function, working memory, visual memory or verbal memory in either blast-related or non-blast related chronic mTBI patients[3]

References: *1. Brenner, Military Med 2009*
2. Brenner, Neuropsychol 2010
3. Belanger, J Int Neuropsych Soc 2009

Cognitive Performance

- Slowed cognitive reaction times reported in U.S. military personnel with both acute blast-related and non-blast-related mild TBI
- Severity related to duration of loss of consciousness

Reference: Luethcke Journal of the International Neuropsychological Society 2011

Emotional Dysregulation, Including Depression and Post-traumatic Stress Disorder

- In 968 veterans, a median 2.5 years after deployment:[1]
  - 47-70 percent with mild TBI also had symptoms of PTSD versus 23 percent without TBI
  - Likewise 23-45 percent had depression versus 15 percent without TBI
  - Highest rates in subjects with blast plus other mechanisms of injury
- 51 percent with major depression within one year after civilian TBI[2]
- Similarly high rates in U.S. military personnel with both blast-related and non-blast-related mild TBI[3]

References: 1. Maguen, J Traumatic Stress 2012
2. Bombardier JAMA 2010
3. Lippa J International Neuropsychological Society 2010

Endocrine Dysfunction

- 11/26 subjects with blast-related mild TBI had abnormal pituitary hormone levels, most commonly:
  - Insulin-like growth factor (IGF)-1: 5/26
  - Testosterone and Lutenizing Hormone: 3/26
  - Vasopressin: 4/26; two low, two high
  - Oxytocin: 4/26
  - Prolactin: 2/26; one low, one high
- Functional implications nor the effects of hormone replacement are known
- Thyroid hormone, cortisol levels generally normal

Reference: Wilkinson Frontiers in Neurology 2012

Alcohol Misuse

- Self-reported in 39 percent of blast-related and 42 percent of non-blast-related TBI patients[1]
- Alcohol abuse reported in 44-62 percent of U.S. military personnel with mild TBI, versus 40 percent of those without TBI[2]

References: 1. Wilk, J Head Trauma Rehab 2010
2. Maguen, J Traumatic Stress, 2012

Thank You

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First Polling Question

Are you a health care provider?

Select “YES”
or
Select “NO”

DEFENSE CENTERS OF EXCELLENCE
For Psychological Health & Traumatic Brain Injury

Screening for Concussion / mTBI in Service Members

Lt. Tracie B. Lattimore, RN, MSN, NP-C
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Outline

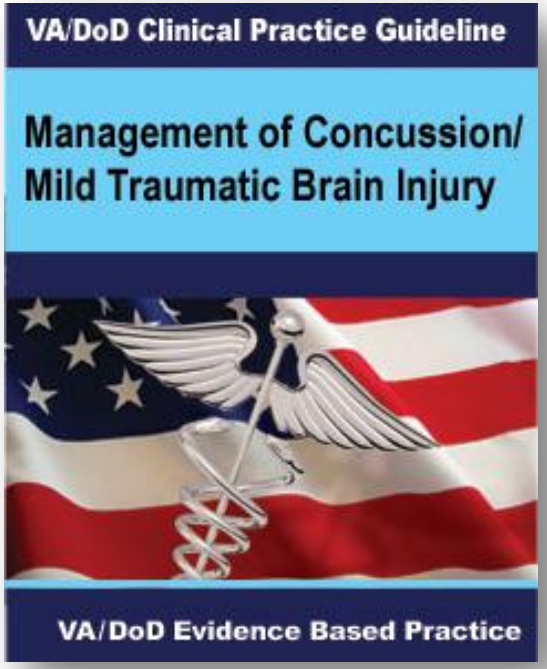
- Background
- Challenges in screening for concussion
- Defense Department screening programs
- Way ahead

Key Traumatic Brain Injury Guidance

Garrison

2009 VA-DoD CPGs

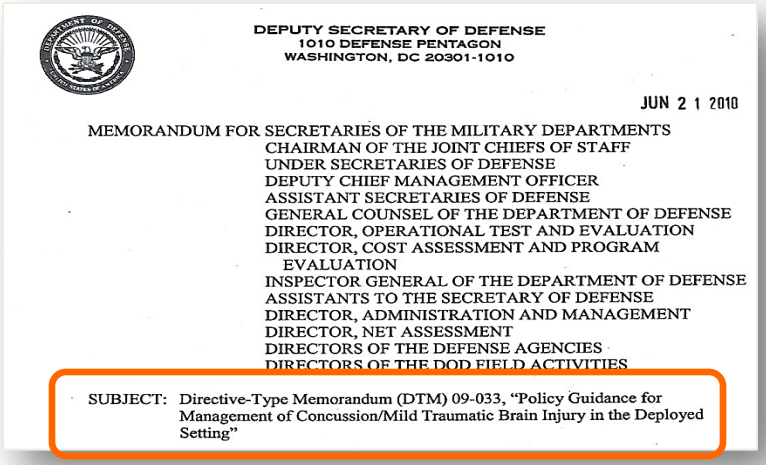
- Highest-rated mTBI CPG in a 2011 research study published in *Brain Injury*



In Theater

DTM 09-033

- Event-based protocol: line and medical responsibilities
- Mandates rest period and medical screening
- Specialized evaluation for multiple concussion



DEPUTY SECRETARY OF DEFENSE
1010 DEFENSE PENTAGON
WASHINGTON, DC 20301-1010

JUN 2 1 2010

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
UNDER SECRETARIES OF DEFENSE
DEPUTY CHIEF MANAGEMENT OFFICER
ASSISTANT SECRETARIES OF DEFENSE
GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE
DIRECTOR, OPERATIONAL TEST AND EVALUATION
DIRECTOR, COST ASSESSMENT AND PROGRAM EVALUATION
INSPECTOR GENERAL OF THE DEPARTMENT OF DEFENSE
ASSISTANTS TO THE SECRETARY OF DEFENSE
DIRECTOR, ADMINISTRATION AND MANAGEMENT
DIRECTOR, NET ASSESSMENT
DIRECTORS OF THE DEFENSE AGENCIES
DIRECTORS OF THE DOD FIELD ACTIVITIES

SUBJECT: Directive-Type Memorandum (DTM) 09-033, "Policy Guidance for Management of Concussion/Mild Traumatic Brain Injury in the Deployed Setting"

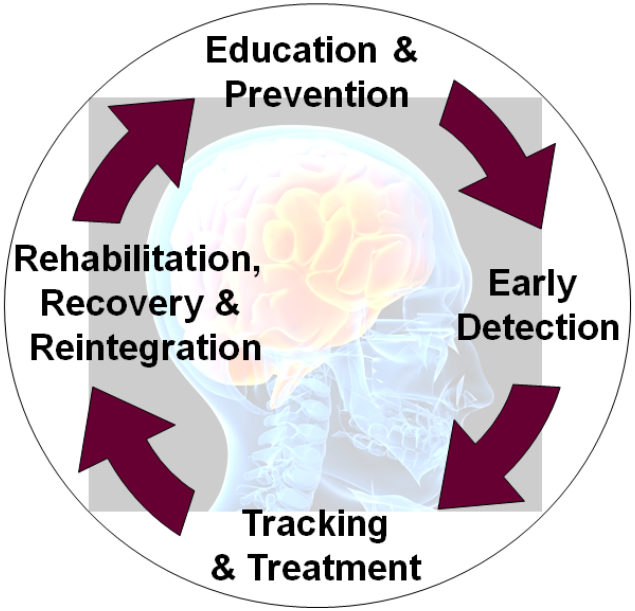
Screening Challenges for the Military

- **Concussions that occur in theater occur under unique circumstances:**
  - In the context of sleep deprivation, nutrition changes, emotional stress
  - With a need for rapid assessment of return to duty status
  - Unique mechanisms of injury
  - Difficult environmental factors
  - Desire to return to the fight
- **Polytrauma patients**
  - Landstuhl / Walter Reed National Military Medical Center

Army Strategy for Concussion Management

Concussion/ mTBI Management

- **Goal**: a cultural change following concussive events
- **Vision:** Every Warrior treated appropriately to minimize concussive injury and maximize recovery
- **Mission:** Produce an educated force trained and prepared to provide early recognition, treatment & tracking of concussive injuries in order to protect Warrior health



Educate → Train → Treat → Track

Directive-Type Memorandum 09-033

Goal: Screen all potentially concussed service members and ensure adequate treatment at point of injury

- **Event driven protocols**: Exposure to potentially concussive events require mandatory medical evaluation and **24-hour rest period** (downtime)
- All sports and activities with risk of concussion are prohibited until **medically cleared**
- Military Acute Concussion Evaluation (MACE) documentation includes **three-part score**
- Concussed soldiers will be given a **standardized educational sheet**
- New protocols for anyone sustaining **multiple** concussions within 12 months
- Shared responsibilities between **medical and line**

Mandatory Screening Events in Theater

Four mandatory events per DTM 09-033:

- Any service member in a vehicle associated with a blast event, collision, or rollover
- All within 50 meters of a blast (inside or outside)
- Anyone who sustains a direct blow to the head
- Command directed
  - Including, though not limited to, repeated exposures to blasts

U.S. Army Photo, http://www.usaasc.info/alt_online/printer_friendly.cfm?iid=0904

Actions Following Mandatory Events

Line/Leadership Actions

- **Screen: Injury, Evaluation, Distance checklist**
  - **Ensures leaders have "eyes-on"**
  - **Does not replace the medical evaluation**
- **Rest: Enforce minimum 24-hour mandatory rest**
- **Report: Using BECIR / CIDNE**

Medical Actions

- **Evaluate: Military Acute Assessment Evaluation (MACE)**
  - **Medical algorithms guide care**
  - **Algorithm for recurrent concussion**
- **Report: Screening and treatment encounters**
  - **Enter note into electronic medical record**

Note: Combined Information Data Network Exchange (CIDNE)
Blast Exposure and Concussion Incident Report (BECIR)

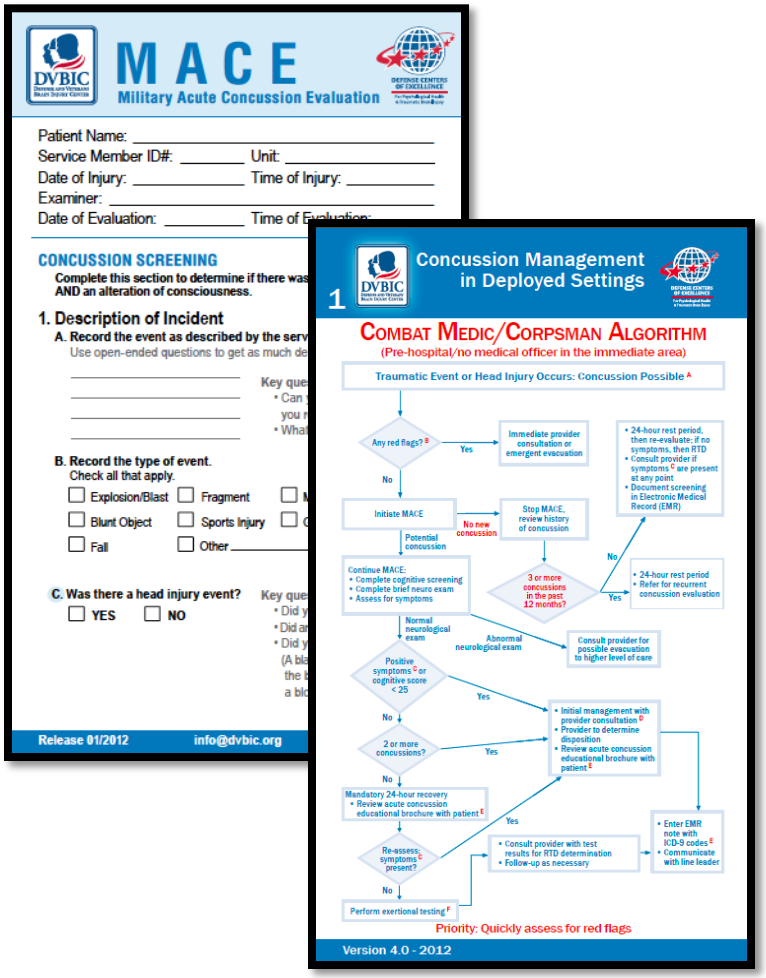
Leadership Assessment (Screening)

- **Injury:**
  - Physical damage to service member's body or body part? (Yes/No)
- **Evaluation:**
  - H*E*A*D*S
- **Distance:**
  - Was service member within 50 meters of blast? (Yes/No)
  - Record the distance from blast for **all** service members
- **Documentation:**
  - Significant activities report (CIDNE / BECIR)

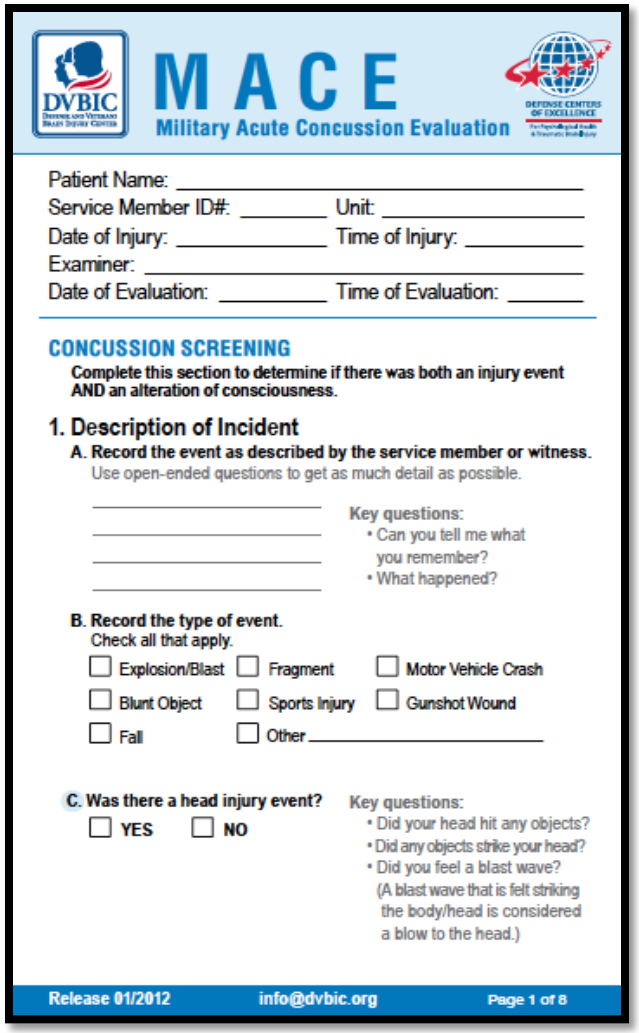
Note: Combined Information Data Network Exchange (CIDNE)
Blast Exposure and Concussion Incident Report (BECIR)

Medical Management of Concussion in Theater

- **Screenings:**
  - Medical screening / evaluation with algorithms
  - Post-Deployment Health Assessment and Post-Deployment Health Re-assessment (PDHA and PDHRA)
- **Assessment Tools:**
  - Military Acute Assessment Evaluation (MACE)
  - Automated Neurological Assessment Metrics (ANAM)



Military Acute Concussion Evaluation (MACE)



MACE
Military Acute Concussion Evaluation

Patient Name: _____
Service Member ID#: _____ Unit: _____
Date of Injury: _____ Time of Injury: _____
Examiner: _____
Date of Evaluation: _____ Time of Evaluation: _____

CONCUSSION SCREENING

Complete this section to determine if there was both an injury event AND an alteration of consciousness.

1. Description of Incident

A. Record the event as described by the service member or witness.
Use open-ended questions to get as much detail as possible.

_____
_____
_____
_____

Key questions:
- Can you tell me what you remember?
- What happened?

B. Record the type of event.
Check all that apply.

☐ Explosion/Blast ☐ Fragment ☐ Motor Vehicle Crash
☐ Blunt Object ☐ Sports Injury ☐ Gunshot Wound
☐ Fall ☐ Other _____

C. Was there a head injury event?
☐ YES ☐ NO

Key questions:
- Did your head hit any objects?
- Did any objects strike your head?
- Did you feel a blast wave? (A blast wave that is felt striking the body/head is considered a blow to the head.)

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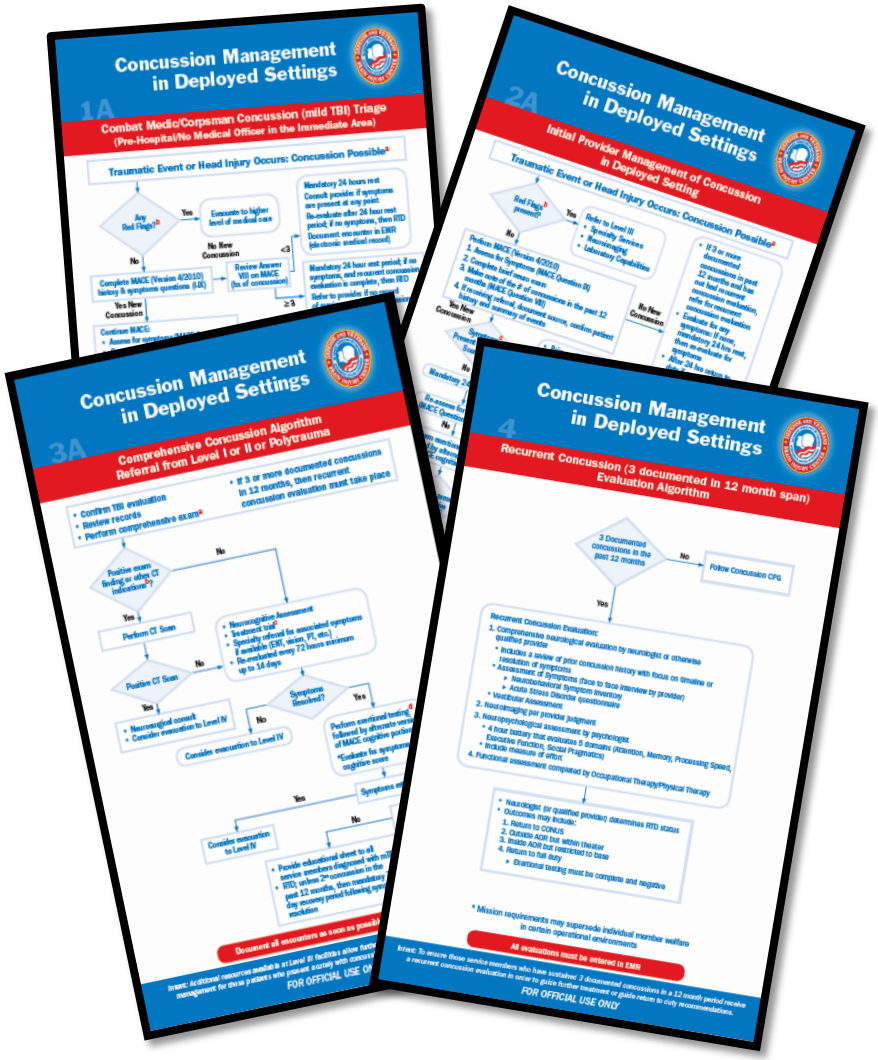
- A standardized clinical interview and exam to screen for concussion
- Questions 1A-C aid in establishing details of the current incident, including:
  - Description of the event
  - The type of event
  - Was there a head injury event
- Questions 2A-C determine if there was alteration of consciousness or memory lapses:
  - Was there AOC?
  - Was there LOC?
  - Was there PTA?

Note: Alteration of consciousness (AOC)
Loss of consciousness (LOC)
Post-traumatic amnesia (PTA)

Clinical Algorithms

- The DTM includes four clinical algorithms to guide all levels of providers through medical management of concussion / mild TBI:
  - Combat Medic / Corpsman
  - Initial Provider
  - Comprehensive Clinical Evaluation
  - Recurrent Concussion Evaluation



Appropriate Use of the Automated Neurological Assessment Metrics (ANAM)

Intended:

- To inform post injury RTD recommendations
- To provide cognitive evaluation for symptomatic service members identified by post-deployment screening

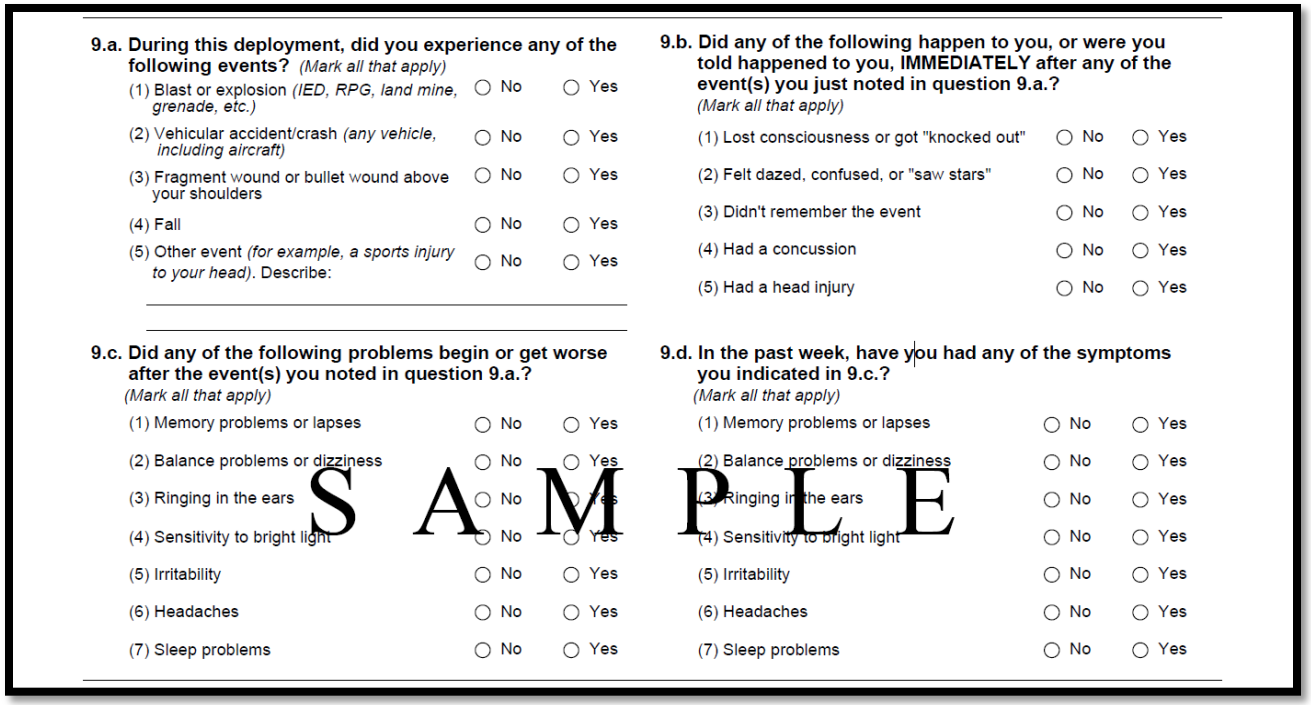
Not Intended:

- As a diagnostic tool for concussion
- As an acute screen for the presence of concussion
- To be the sole source of information regarding triage or return to duty
- For population-based TBI post-deployment screening

Note: Return to duty (RTD)

Post-Deployment Health Assessment

- Self-report
  - Army has automatic flag tied to CIDNE / BECIR data
- Flags require immediate follow-up evaluation
  - Evaluation can trigger referral to appropriate provider



9.a. During this deployment, did you experience any of the following events? *(Mark all that apply)*

(1) Blast or explosion *(IED, RPG, land mine, grenade, etc.)*	○ No	○ Yes
(2) Vehicular accident/crash *(any vehicle, including aircraft)*	○ No	○ Yes
(3) Fragment wound or bullet wound above your shoulders	○ No	○ Yes
(4) Fall	○ No	○ Yes
(5) Other event *(for example, a sports injury to your head)*. Describe:	○ No	○ Yes

9.b. Did any of the following happen to you, or were you told happened to you, IMMEDIATELY after any of the event(s) you just noted in question 9.a.? *(Mark all that apply)*

(1) Lost consciousness or got "knocked out"	○ No	○ Yes
(2) Felt dazed, confused, or "saw stars"	○ No	○ Yes
(3) Didn't remember the event	○ No	○ Yes
(4) Had a concussion	○ No	○ Yes
(5) Had a head injury	○ No	○ Yes

9.c. Did any of the following problems begin or get worse after the event(s) you noted in question 9.a.? *(Mark all that apply)*

(1) Memory problems or lapses	○ No	○ Yes
(2) Balance problems or dizziness	○ No	○ Yes
(3) Ringing in the ears	○ No	○ Yes
(4) Sensitivity to bright light	○ No	○ Yes
(5) Irritability	○ No	○ Yes
(6) Headaches	○ No	○ Yes
(7) Sleep problems	○ No	○ Yes

9.d. In the past week, have you had any of the symptoms you indicated in 9.c.? *(Mark all that apply)*

(1) Memory problems or lapses	○ No	○ Yes
(2) Balance problems or dizziness	○ No	○ Yes
(3) Ringing in the ears	○ No	○ Yes
(4) Sensitivity to bright light	○ No	○ Yes
(5) Irritability	○ No	○ Yes
(6) Headaches	○ No	○ Yes
(7) Sleep problems	○ No	○ Yes

SAMPLE

Note: Combined Information Data Network Exchange (CIDNE)
Blast Exposure and Concussion Incident Report (BECIR)

Way Ahead

- Translate theater successes to garrison setting
  - Policy, databases, education, standardized systems of care
- Maximizing education/training for medical and line assets
- Partnerships with civilian and Defense Department experts
- Translate research into clinical practice

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Polling Question

Are you attending this webinar to obtain CEUs or CMEs?

Select “YES”
or
Select “NO”

DEFENSE CENTERS OF EXCELLENCE
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Mild TBI Pocket Guide (CONUS)

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Department of Veterans Affairs Consensus Conference on Mild TBI, PTSD and Pain

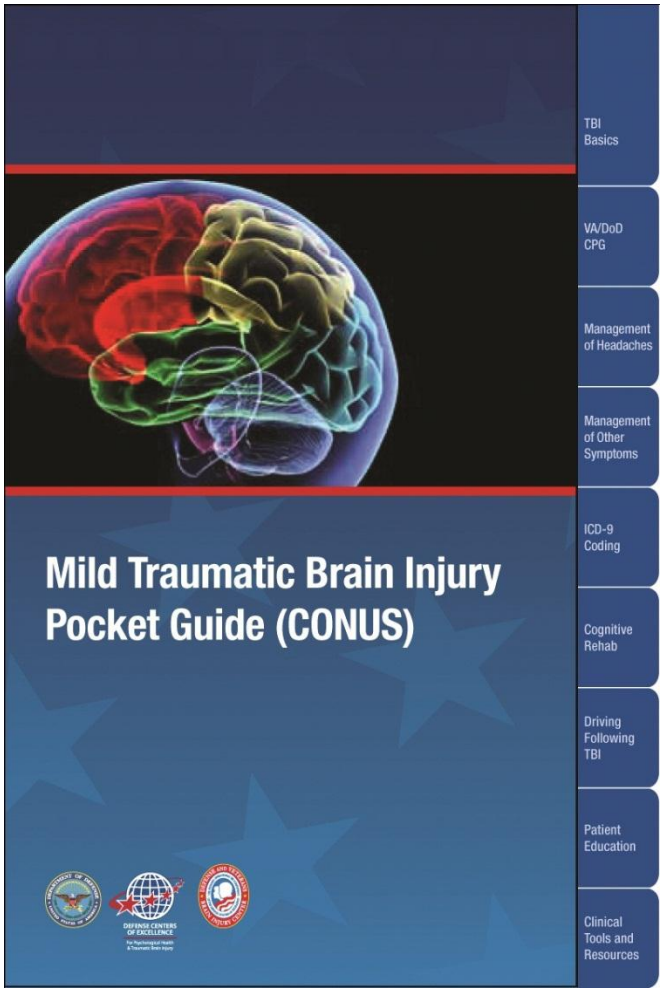
Recommendations:

- Most effective treatment strategies include current CPGs for the three co-morbidities
- Understanding guidance in all three guidelines is challenge to providers
- Need brief clinical support tool that brings together the three guidelines in a way that clinicians can actually use

Note: Clinical Practice Guideline (CPG)
Reference: Dept. of Veterans Affairs Consensus Conference on mTBI, PTSD and Pain, June 2009.

Mild TBI Pocket Guide (CONUS)

- Quick-reference resource on treatment and management of mild TBI including:
  - Evidence-based recommendations
  - ICD-9 coding guidance
  - Clinical recommendations for cognitive rehabilitation
  - Clinical recommendations on assessing ability to drive safely
  - Patient education materials
  - Clinical tools and resources
- Free copies of pocket guide can be ordered through DCoE website



Thank You

- Throughout the webinar, you are welcome to submit questions via the Adobe Connect or Defense Connect Online question box located on the screen.

- The question box is monitored during the webinar and questions will be forwarded to our presenters for response during the Question-and-Answer Session during the last half hour of the webinar.

- Our presenters will respond to as many questions as time permits.

Question-and-Answer Session

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Save the Date

DCoE Monthly Webinar:

Children of Deployed Parents: Health Care Provider Strategies for Enhancing Coping Skills

April 26, 2012
1-2:30 p.m. (EST)

APRIL						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

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